

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 September 2005 (01.09.2005)

PCT

(10) International Publication Number
WO 2005/081401 A1

(51) International Patent Classification⁷: **H03F 1/32,**
H05K 7/20

(21) International Application Number:
PCT/GB2005/000571

(22) International Filing Date: 16 February 2005 (16.02.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0403382.5 16 February 2004 (16.02.2004) GB

(71) Applicant (for all designated States except US): **E2V TECHNOLOGIES (UK) LIMITED** [GB/GB]; Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HALL, Terence, Martyn** [GB/GB]; E2V Technologies (UK) Limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB). **COLLINS, Tony, Glen** [GB/GB]; E2V Technologies (UK) Limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB). **HURRELL, Stephen, William** [GB/GB];

E2V Technologies (UK) Limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB). **NORRINGTON, Stephen, John** [GB/GB]; E2V Technologies (UK) Limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB). **WOOD, Andrew, Murray** [GB/GB]; E2V Technologies (UK) Limited, Waterhouse Lane, Chelmsford, Essex CM1 2QU (GB).

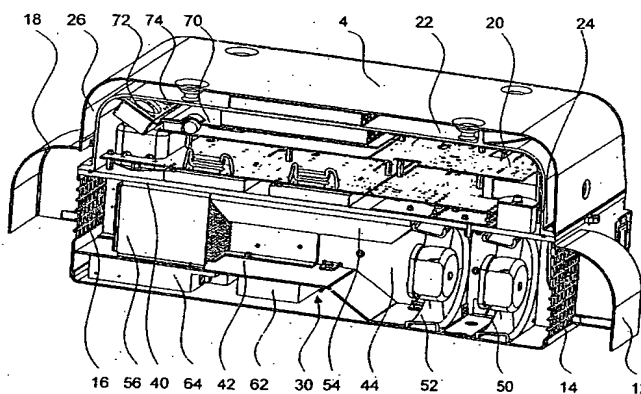
(74) Agent: **REDDIE & GROSE**; 16 Theobalds Road, London WC1X 8PL (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: ELECTRICAL APPARATUS AND COOLING SYSTEM



(57) Abstract: An electrical apparatus and cooling system is described, having an arrangement particularly suited to electrical apparatus incorporating devices which produce a significant amount of heat, such as vacuum tube devices. The electrical apparatus has an enclosure cover (22) and a base plate (6) defining an enclosure (20) containing the part of the electrical apparatus to be cooled, and an outer cover (4) enclosing the first to create a surrounding space (26) therebetween. Means (22, 76 and 78) are provided to transfer heat from the enclosure to the surrounding space. Cooling fans (50) and (52) located outside of the surrounding space create a flow of air which passes through a heat exchange structure mounted (54) adjacent the enclosure to provide a cooling effect. Some of the air flow is also ducted through the surrounding space, to cool the enclosure cover (22). Additionally, a circulating flow of air is established in the enclosure, thereby enhancing the transfer of heat from the enclosure to the surrounding space.



FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations* AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT,

BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.